IHNV resistance of Steelhead fry (STT-BCW-04-COL)

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Background: Steelhead trout and Spring-run Chinook have been identified as priority species in restoration efforts within Battle Creek. Natural Steelhead adults are passed above the hatchery during their winter spawning run. Infectious Hematopoietic Necrosis Virus (IHNV) is very prevalent in adult Fall and Late-fall Chinook salmon that return to Battle Creek. Steelhead adult migration and holding overlaps both of these Chinook runs in Battle Creek and IHNV has been isolated from the ovarian fluid of Steelhead held with salmon at CNFH. During high winter flows, adult Late Fall Chinook can pass over the hatchery weir and move up into reaches containing Steelhead redds. This overlap of virusshedding salmon with steelhead alevins and fry represents a potential health risk for the trout. The L-clade of IHNV found in California is typically not lethal to trout species. This situation changed in 2000 at Feather River State Fish Hatchery where mortality due to IHNV occurred in production Steelhead. Genetic analysis of the isolate indicates that it is a distinct genotype from those isolates collected from Coleman NFH adult salmon (Hedrick 2004). There have been no controlled studies on the effect of Battle Creek Chinook salmon IHNV on steelhead fry.

Hedrick RP 2004 Department of Medicine and epidemiology, School of Veterinary Medicine University of California Davis CA 95616. Final Report - A plan for basin-wide research on Infectious Hematopoietic Necrosis Virus (IHNV) in Salmon and Trout in California. Depart. Of Water Resources Ecological Studies Program Contract.

<u>Objective</u>: Determine if various concentrations of IHNV from CNFH Chinook salmon adults will infect and induce a disease state in Steelhead fry.

<u>Methods:</u> Virus used in the challenge was isolated from adult Late fall Chinook salmon spawned at Coleman NFH in 2003. Steelhead fry (25mm Fork length) from broodyear 2004 were placed into aerated 1 L containers held at ambient water temperature (12°C) for a 30 min static challenge. The containers contained either:

- 1. tissue culture media (MEM) without virus = control
- 2. 1 mL , 10 mL, and 25 mL of media containing IHNV (10^9 PFU/mL from 48h post-inoculation EPC culture). Estimate virus concentration was 10^6 , 10^7 , 2.5×10^7 PFU/mL .
- 3. Juvenile Fall-run Chinook (55 mm FL) were challenged with 10 mL of virus media.

Challenged fish were held in 40L aquaria supplied with 11- 12°C water and aeration. Fish were fed a commercial salmon diet daily. After 16 days, all fish were sampled for viral assays (whole fish "triangle" cut for Steelhead and kidney-spleen for Chinook) on EPC cell line held at 15°C for 3 weeks.

<u>Results</u> No mortality occurred in either the trout or salmon groups during the 16 day post-challenge period. Virus was isolated from 4 of 6 (2 pool) salmon samples. No cytopathic effect (CPE= distinct plaques in cell sheet) was observed in any Steelhead fry sample.

Table 1. Virus isolation (CPE) in challenged Steelhead and Chinook fry.

Group	Virus isolation
STT Control	0/4
STT 1mL	0/8
STT 10 mL	0/4
STT 25 mL	0 / 16
FCS 10 mL	4 / 6 (2 pool)

Conclusion: In accordance with the historical lack of IHNV infection and disease observed in CNFH Steelhead fry, artificially challenged fry were refractory to IHNV infection. The risk of IHNV disease affecting Steelhead alevin and fry in Battle Creek due to virus shedding by adult salmon is rated as very low.